

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Draft Staff Report

Implementation of SB 656: Measures to Reduce Particulate Matter

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EXECUTIVE SUMMARY

Pursuant to Senate Bill 656 (SB 656, Sher), codified as Health and Safety Code (H&SC) section 39614, the California Air Resources Board (ARB), in coordination with local air districts, has developed a list of the most readily available, feasible, and cost-effective control measures that could be employed to reduce particulate matter emissions (i.e., PM₁₀ and PM_{2.5}, collectively referred to as PM). The ARB-list of control measures (adopted by ARB in November 2004) is based on rules, regulations, and programs adopted by ARB or local air districts in California as of January 1, 2004, to reduce emissions from new, modified, and existing stationary, area, and mobile sources. Subsequent to the development of the control measure list by ARB, local air districts are required to perform an assessment of the nature and severity of the PM problem in each district followed by an evaluation of the cost-effectiveness of a subset of measures on the ARB-list appropriate to the specific needs of the area. No later than July 31, 2005, implementation schedules must be adopted by the ARB for the State measures on the list and by each district for the most cost-effective local measures selected from the list. Each local district will prioritize the adoption and implementation schedule of proposed control measures based on their effect on public health, air quality, and emissions reductions, and on the cost-effectiveness of each control measure. This staff report has been prepared to satisfy these requirements.

South Coast Air Quality Management District (AQMD) staff has conducted a review of the control measures compiled by the ARB pursuant to SB 656. For the majority of the stationary and area source categories, AQMD has been identified as having the most stringent rules in California. Evaluation of these measures confirms that AQMD's existing rules and regulations have equivalent or more stringent emission control requirements than most of these measures. AQMD staff has identified one source category (i.e., wood-burning fireplaces/heaters) for which no equivalent AQMD rule currently exists. However, control of emissions from this source category is already addressed under 2003 Air Quality Management Plan (AQMP) Control Measure MSC-06 which is scheduled for adoption in 2005. SB 656 excludes from the implementation schedule any measures which are already scheduled for adoption within two years of the date of adoption of the implementation schedule. Therefore, this measure is not included on an AQMD SB 656 implementation schedule.

In addition, staff has identified three rules on ARB's list which include specific requirements that appear to be more stringent than corresponding requirements in AQMD's existing regulations for these sources. These include a rule for boilers, steam generators, and process heaters (San Joaquin Valley Air Pollution Control District (SJVAPCD) Rule 4306), another for gas turbines (SJVAPCD Rule 4703), and one for organic liquid storage (Bay Area Air Quality Management District (BAAQMD) Rule 8-5). Analyses of these more stringent requirements within the context of AQMD's existing rules and the nature of sources within the South Coast district indicate that SJVAPCD Rule 4703 and BAAQMD Rule 8-5 would not be feasible or cost-effective for sources within the jurisdiction of the AQMD. The applicability and feasibility of the requirements in SJVAPCD Rule 4306 to sources in the district which are not in the RECLAIM program but are subject to AQMD Rule 1146 (Emissions of Oxides of Nitrogen from Industrial, Institutional and Commercial Boilers, Steam Generators, and Process Heaters) will be evaluated during the rule amendment process currently scheduled for adoption in October 2005. Consequently, pursuant to

the guidance in SB 656, there is no need to include amendments to Rule 1146 on an AQMD SB 656 implementation schedule.

BACKGROUND

In 2003, the California Legislature enacted SB 656 (codified as H&SC section 39614), to further reduce public exposure to particulate matter. SB 656 required the ARB to develop a list of the most readily available, feasible, and cost-effective control measures that could be employed to reduce PM emissions and thus make progress toward attainment of State and national PM₁₀ and PM_{2.5} standards. To meet the requirement of H&SC section 39614 (b), ARB staff has developed a list of control measures in coordination with local air districts based on California rules, regulations, and programs existing as of January 1, 2004. These measures as well as guidelines for local district implementation of SB 656 are set forth in the ARB Staff Report entitled *Proposed List of Measures to Reduce Particulate Matter - PM₁₀ and PM_{2.5}* (October 2004) (<http://www.arb.ca.gov/pm/pmmeasures/pmmeasures.htm>), which was adopted by ARB in November 2004.

After performing an assessment of the nature and severity of the PM problem followed by an evaluation of the cost-effectiveness of measures appropriate to the specific needs of the area, each local air district is required to adopt an implementation schedule for selected measures by July 31, 2005. Air districts must adopt implementation schedules for applicable measures at a noticed public meeting and after at least one public workshop. Additionally, no later than January 1, 2009, the ARB must prepare a report describing actions taken to fulfill the requirements of the legislation as well as recommendations for further actions to assist in achieving the State PM standards. The bill requirements sunset on January 1, 2011, unless extended.

ASSESSMENT OF PARTICULATE MATTER PROBLEM

Federal annual and 24-hour PM₁₀ ambient air quality standards are 50 µg/m³ and 150 µg/m³, respectively. Federal annual and 24-hour PM_{2.5} ambient air quality standards are 15 µg/m³ and 65 µg/m³, respectively. The South Coast Air Basin and Coachella Valley are both classified as “Serious Nonattainment” for PM₁₀. Relative to PM_{2.5}, the South Coast Air Basin is designated as “Nonattainment;” the Coachella Valley is designated as “Unclassifiable/Attainment.”

The State annual and 24-hour PM₁₀ standards are 20 µg/m³ and 50 µg/m³, respectively, while the State PM_{2.5} annual average standard is set at 12 µg/m³. The State has not set a 24-hour PM_{2.5} standard. These stringent State PM standards have not been met in either the South Coast Air Basin or the Coachella Valley.

AQMD staff has recently performed a trend analysis for PM. In summary, in 2004 the South Coast Air Basin and the Coachella Valley recorded the lowest maximum annual average PM₁₀ concentrations since monitoring commenced in 1987. Similarly, annual average PM_{2.5} concentrations were also the lowest since monitoring began six years ago. Unlike the Coachella Valley, the South Coast Air Basin continues to exceed the federal standards for both annual average PM₁₀ and PM_{2.5}. While the South Coast Air Basin did not experience a violation of the

24-hour average PM₁₀ standard in 2004, the daily average concentration exceeded the standard on one day in the Coachella Valley. However, this exceedance is being investigated as a potential "High Wind Event" for exclusion based on U.S. EPA's Natural Events Policy. Daily average PM_{2.5} concentrations in the South Coast Air Basin exceeded the federal standard at the majority of the sites. Favorable weather conditions which led to cooler temperatures and weaker inversions, together with continued implementation of AQMD's comprehensive air pollution control strategies, have contributed to the observed air quality trend.

Pertinent to AQMD's assessment of potential measures to further reduce PM emissions is an evaluation of speciated PM emissions data. Emissions data indicate that the PM₁₀ emissions inventory, particularly in the eastern portion of the South Coast Air Basin and in the Coachella Valley, is dominated by primary particulates, especially fugitive dust. Therefore, the most effective strategy to ensure attainment of PM₁₀ standards would be to reduce fugitive dust emissions. Conversely, secondary particulates associated with industrial sources and exhaust from on- and off-road sources are significant contributors to the PM_{2.5} emissions inventory.

It is also important to understand the significant components of PM_{2.5} which are depicted in Figure 1. The ammonium, nitrates, sulfates, and organics combined represent the dominant fraction of PM_{2.5} on both an annual and episodic (24-hour) basis. Note, too, that the crustal component, as identified within the category labeled "others," and which represents a significant fraction of PM₁₀, plays a very small role with respect to the PM_{2.5} 24-hour average. For the 24-hour PM_{2.5} standard, it is evident that significant reductions in ammonium and nitrates will be needed over and above the current PM₁₀ control strategy in order to attain the standard. Appreciable reductions will also be needed for both organic and elemental carbon, the former from VOC emissions and the latter from soot emissions, primarily from diesel exhaust. Because no single PM_{2.5} precursor alone dominates the annual average PM_{2.5} concentrations, significant reductions on all precursors will be needed to meet the annual average PM_{2.5} standard.

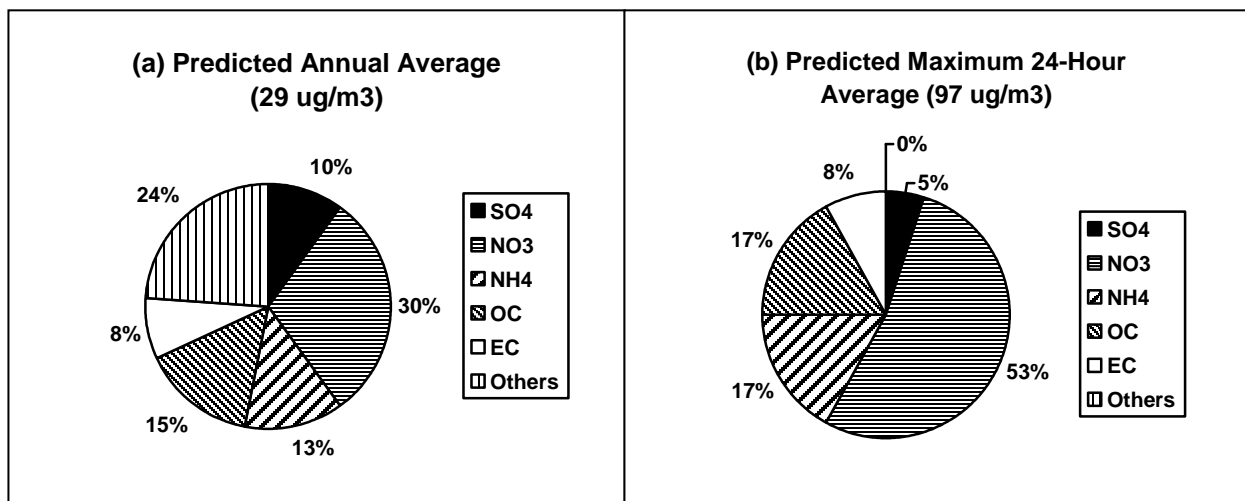


FIGURE 1

Estimated PM_{2.5} Components in 2006

EVALUATION OF SB 656 CONTROL MEASURES

ARB Guidance on Implementing SB 656

In adopting an implementation schedule for SB 656 measures, each air district is expected to first characterize the major components of PM in their area to determine the most appropriate level and type of control approach. Within this context, air districts then select and prioritize the most cost-effective subset of measures appropriate to their local situation to make progress towards attaining the PM standards.

The ARB's list of air district measures represents guidance on the scope and level of emission control for each source category, accompanied by a reference to a specific air district rule or rules. These rules are referenced with specific rule language as adopted. However, air districts do not need to incorporate the exact language of the referenced rules, but rather should match the scope and emission limits within the context and structure of their local rulebooks and the nature of sources within their air district.

In prioritizing the most cost-effective measures for their implementation schedules, it is important to recognize that not all rules are equally cost-effective or appropriate in all areas of the State. Cost-effectiveness and feasibility will vary depending upon the number, size, and configuration of sources within a jurisdiction, and the contribution of that source to local PM concentrations. Cost-effectiveness is also dependent upon the existing degree of control for a given source type. Furthermore, in adopting an implementation schedule, air districts are to consider technological feasibility, emission reduction potential, rate of reduction, public acceptance, and enforceability, in addition to cost-effectiveness. Therefore, it is the air district's discretion to select, based on the magnitude and nature of their PM problem, a subset of measures to most cost-effectively address their specific PM problem.

In adopting an implementation schedule, air districts must also consider other ongoing programs such as measures being adopted to meet federal air quality standards or the State ozone planning process. Additionally, the implementation schedule may not include any measures that are substantially similar to one already adopted by an air district, or scheduled for adoption within two years of adoption of the implementation schedule. While the measures selected to fulfill the requirements of SB 656 must be different from any measures already planned to meet other requirements, the legislation does not require that any planned measure be accelerated. Air districts may modify their implementation schedules if circumstances change with respect to attainment status, the nature of sources, or the effects of ongoing control programs.

AQMD Staff Analysis

Based on H&SC Section 39614 and the guidance provided by ARB, AQMD staff has evaluated the control measures on the ARB list to determine which measures may be appropriate to the local situation and help make progress towards attaining the PM standards. As stated earlier, the most effective strategy to attain the PM10 standards is to control fugitive dust emissions. However, with respect to PM2.5 standards, reductions in PM2.5 precursors (i.e., NOx, VOC, ammonia) would be necessary. Considering the extensive PM control strategy already employed by the AQMD (including existing rules and 2003 AQMP control measures), staff has identified

only four control measures on the ARB list that may be applicable to the district relative to SB 656 requirements. While the AQMD has previously adopted comprehensive rules regulating the sources subject to three of these control measures, staff has identified requirements in other districts' rules for particular equipment categories that appear to be more stringent than those in AQMD's existing rules.

One measure identified by AQMD staff which appears to be more stringent than AQMD's corresponding rule is SJVAPCD Rule 4703 – Stationary Gas Turbines. This measure includes an emission limit for gas turbines greater than 10 megawatts (MW) of 5 parts ppm NO_x. The emission limits in AQMD Rule 1134 – Emissions of Oxides of Nitrogen from Stationary Gas Turbines, for units 10 MW or greater is 9 ppm NO_x with selective catalytic reduction (SCR) and 12 ppm NO_x without SCR; for units 60MW and over, the NO_x limits are 9 ppm with SCR and 15 ppm without SCR. However, it should be noted that SJVAPCD Rule 4703 sets NO_x limits substantially higher than those in AQMD Rule 1134 for all turbine sizes when combusting liquid fuel. Additionally, the NO_x limits for turbines less than 10 MW in SJVAPCD Rule 4703 are higher than the corresponding limits in AQMD Rule 1134 regardless of fuel type.

A second measure which may be more stringent than AQMD's corresponding rule is BAAQMD Rule 8-5 – Organic Liquid Storage. BAAQMD Rule 8-5 regulates VOC emissions from storage tanks with a capacity of 264 gallons or greater whereas AQMD Rule 463 – Organic Liquid Storage, primarily applies only to above-ground stationary tanks with capacities of 19,815 gallons or greater. The requirements of AQMD Rule 463 do apply to above-ground tanks with capacities as low as 251 gallons when storing gasoline.

A third measure, SJVAPCD Rule 4306 – Boilers, Steam Generators, and Process Heaters (Phase 3), primarily requires NO_x emissions from boilers, steam generators, and process heaters to not exceed 15 parts per million (ppm) for units with a rated heat input between 5 and 20 million Btu (MMBtu) per hour; NO_x emissions from units with a rated heat input greater than 20 MMBtu per hour are limited to 9 ppm.¹ The corresponding NO_x emission limit in AQMD Rule 1146 is 30 ppm. It should be noted that SJVAPCD Rule 4306 allows a NO_x limit of 40 ppm for units operating on liquid fuel, whereas the NO_x limits in AQMD Rule 1146 does not differentiate between fuel types.

Finally, AQMD staff has identified the source category of wood-burning fireplaces/heaters for which the AQMD does not have a regulation equivalent to those on the ARB list.

AQMD Rule 1134

Although the majority of gas turbines operating in the Basin are covered under the stringent AQMD RECLAIM program, staff has identified approximately 10 gas turbines 10 MW or greater operating in non-RECLAIM facilities which are subject to Rule 1134 requirements. As part of the rule development efforts for the January 2005 RECLAIM amendments, gas turbines at RECLAIM facilities were evaluated for potential reductions to reflect latest Best Available Retrofit Control Technology (BARCT). While SJVAPCD Rule 4703 has more stringent emission limits for gas turbines greater than 10 MW and retrofits with SCR have been achieved in

¹ While SJVAPCD Rule 4306 limits refinery units with a rated heat input > 110 MMBtu to 5 ppm NO_x, all such units in the South Coast district are in the RECLAIM program and are not subject to Rule 1146.

practice, it was determined that retrofits of existing units would not be cost-effective under RECLAIM. The comprehensive analysis performed under RECLAIM as well as further evaluation completed for non-RECLAIM units indicate that achieving a 5 ppm NO_x emission limitation would also not be cost-effective for this equipment category for sources subject to Rule 1134. Staff has estimated the cost-effectiveness of reducing the NO_x emission limits for existing 60 MW or greater gas turbines from 15 ppm to 5 ppm, and reducing the NO_x limits for 10 MW or greater units from 9 ppm to 5 ppm for both 10 and 15 year equipment life. For a 10 year equipment life the cost-effectiveness of reducing the NO_x limit from 15 ppm to 5 ppm or from 9 ppm to 5 ppm is estimated to be approximately \$82,000 and \$205,000 per ton of NO_x reduced, respectively. For a 15 year equipment life, the cost-effectiveness for reducing the NO_x limit from 15 ppm to 5 ppm or from 9 ppm to 5 ppm is estimated to be approximately \$68,000 and \$170,000 per ton of NO_x reduced, respectively. These values are not considered cost-effective for BARCT requirements. It should be noted that most of the emission reductions from the provisions of SJVAPCD Rule 4703 for turbines 10 MW or greater are from turbines with higher NO_x limits (e.g., approximately 16 to 40 ppm) as compared to turbines subject to AQMD Rule 1134 which are subject to NO_x limits of 9 to 15 ppm. Therefore, the emission reductions from turbines meeting the limits in SJVAPCD Rule 4703 would be more cost-effective than would be reductions from turbines currently meeting the NO_x limits in AQMD Rule 1134. In summary, because of the infeasibility of the NO_x limits for 10 MW or greater units in SJVAPCD Rule 4703 for sources in the South Coast district, an amendment to AQMD Rule 1134 is not identified on an AQMD SB 656 implementation schedule.

AQMD Rule 463

Pursuant to 1997 AQMP Control Measure FUG-03 – Further Emission Reductions from Floating Roof Tanks, AQMD staff previously investigated the potential reduction of VOC emissions from small storage tanks that were not regulated by Rule 463 (*Technical Assessment, Proposed Rule 463.1 – VOC Emissions from Small Organic Liquid Storage Tanks*, AQMD, 1997). Based upon the analysis, AQMD staff determined that the average cost effectiveness to implement proposed Rule 463.1 was excessive (in excess of \$1.5 million per ton of VOC) because of the high cost of control and the small potential emission reductions (approximately 0.1 to 0.2 tons per day). Staff is currently conducting an updated feasibility analysis for this source category pursuant to the AQMD Governing Board resolution for the 2003 AQMP which commits staff to perform technology assessments to achieve further VOC reductions for at least three source categories per year. Depending on the results of the updated feasibility analysis, AQMD staff will determine whether or not to proceed with rule development to further control emissions from organic liquid storage operations. It should also be noted that the requirements for BAAQMD Rule 8-5 depend on both the size of the storage tank and the true vapor pressure of the stored product. The rule sets different requirements for organic liquids in the true vapor pressure ranges of: 1) >0.5 to ≤1.5 pounds per square inch absolute (psia), 2) >1.5 to <11 psia, and 3) ≥11 psia. While AQMD Rule 463 does not cover storage tanks less than 19,815 for organic liquids other than gasoline, a preliminary review of the permit database indicates that many of these tanks are already equipped with pressure vacuum valves (to protect the integrity of the tank from expanding vapors). Since pressure vacuum valves are one of the means of compliance in BAAQMD 8-5 for organic liquids >1.5 to <11 psia, many of the storage tanks in the jurisdiction of the AQMD are in compliance with this requirement of the BAAQMD rule. The requirements of BAAQMD Rule 8-5 which may not be met in all cases for tanks between 264 and 19,815 gallons in the district are those for a

submerged fill pipe for low-vapor pressure organic liquid and for a pressure tank (or an approved emission control system) for the storage of organic liquid ≥ 11 psia. In summary, because of the infeasibility of the BAAQMD Rule 8-5 for these types of AQMD sources, an amendment to AQMD Rule 463 is not identified on an AQMD SB 656 implementation schedule.

AQMD Rule 1146

AQMD Rule 1146 is included on the AQMD Governing Board approved 2005 Rule and Control Measure Forecast Report, which highlights AQMD rulemaking activity scheduled for the year 2005. Amendments to Rule 1146 are tentatively scheduled for October 2005. As part of the rulemaking process, AQMD staff will review the requirements in SJVAPCD Rule 4306 to determine if feasible and cost-effective controls are available to further reduce emissions from boilers, steam generators, and process heaters (greater than 5 MMBtu) operating in the South Coast district. Since potential amendments to AQMD Rule 1146 are already scheduled, there is no need to identify and include this control measure on a SB 656 implementation schedule. H&SC Section 39614(d)(2)(3)(B) states that the implementation schedule shall not include any measure that is substantially similar to a control measure scheduled for adoption within two years of the adoption of the implementation schedule.

It should be noted that SJVAPCD Rules 4703 and 4306 and BAAQMD Rule 8-5 do not provide reductions in primary particulates, but rather reduce pollutants (i.e., NO_x, VOC) that may lead to the formation of secondary particulates. Data analysis of the particulate samples from the one South Coast Air Basin monitoring station (Rubidoux) which continues to exceed the federal annual average PM₁₀ standard indicates that primary particulates dominate the ambient PM₁₀ concentrations registered by the monitoring station. The PM problem in the Coachella Valley is also dominated by directly emitted PM₁₀, specifically fugitive dust. Therefore, the potential of these three control measures in improving PM₁₀ air quality in the South Coast Air Basin or Coachella Valley would at best be limited. It is acknowledged, however, that reductions in NO_x and VOC would benefit the PM_{2.5} air quality in the South Coast Air Basin.

Wood-Burning Fireplaces/Heaters

Notwithstanding the three control measures discussed above, staff has identified only the source category of wood-burning fireplaces/heaters for which the AQMD does not have a regulation equivalent to those on the ARB list. However, since the 2003 AQMP (adopted August 2003) includes a control measure for this category, there is no need to identify and include this control measure on a SB 656 implementation schedule. This is consistent with H&SC Section 39614(d)(2)(3)(B) which states that the implementation schedule shall not include any measure that is substantially similar to a control measure scheduled for adoption within two years of the adoption of the implementation schedule. Specifically, 2003 AQMP Control Measure MSC-06: Emission Reductions from Wood Burning Fireplaces and Stoves (2003 AQMP, Appendix IV-A, page IV-60), is already scheduled for adoption in 2005.

CONCLUSION

AQMD has in place a comprehensive program to achieve State and federal ambient air quality standards, including PM10 and PM2.5 standards. This program includes, but is not limited to, stringent rules, regulations, and AQMP control measures, incentive programs, and an extensive technology advancement research and development program, which work together to aggressively reduce emissions of PM and its precursors. AQMD's 2003 AQMP, adopted by the AQMD in August 2003 and by ARB in October 2003 as part of the State Implementation Plan (SIP), successfully demonstrates attainment of the PM10 standard for the regions within AQMD's jurisdiction by the Clean Air Act compliance date of December 31, 2006. Additionally, AQMD has already begun work on the next SIP cycle. Under AQMD's current planning scenario, the 2007 SIP will address both the 8-hour ozone and the PM2.5 standards, even though the PM2.5 SIP submittal date pursuant to the Clean Air Act is not until April 2008. Since substantial reductions of direct PM emissions as well as secondary PM will be required to attain the 8-hour ozone and PM2.5 standards, AQMD's accelerated development of the PM2.5 SIP will facilitate expedited progress toward attainment of State and national PM standards.

In summary, AQMD's existing and proposed regulations and 2003 AQMP control measures effectively address all source categories and control measures on ARB's SB 656 list. Therefore, there is no need to have an SB 656 implementation schedule for additional measures.